

Public Comment Collaboration on EC-71 – May 6, 2010

The purpose of this document is to recap the status of EC-71 submitted by DOE with the intent of improving energy efficiency in residential buildings by requiring high-reflectance on low-sloped roofs in cooling-dominated climates.

Current 2009 IECC

There are currently no prescriptive requirements for high-reflectance roofs. Section 405 (SIMULATED PERFORMANCE ALTERNATIVE) does define roof reflectance (absorptance, actually) and emittance for the standard reference design. From Table 405.5.2(1):

Roofs	Type: composition shingle on wood sheathing	As proposed
	Gross area: same as proposed	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed

Original Code Change Proposal as Published in the Monograph

EC71–09/10

202 (New), 402.3 (New), 402.3.1 (New), Table 402.3(1) (New), Chapter 6 (New); IRC R202 (New), N1102.3 (New), N1102.3.1 (New), Table N1102.3(1) (New), Chapter 44

Proponent: Ronald Majette, US Department of Energy

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC COMMITTEE. PART II WILL BE HEARD BY THE IRC BUILDING/ENERGY COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

1. Add new definitions as follows:

REFLECTANCE, SOLAR. The ratio of reflected solar flux to incident solar flux.

ABSORPTANCE, SOLAR. The difference 1.0 minus the *solar reflectance*.

2. Add new text and table as follows:

402.3 Solar properties of opaque surfaces (Prescriptive).

402.3.1 Solar absorptance of roofs. Roofs in climate zones 1, 2, and 3 having a ratio of rise to run less than or equal to 2:12 (9.5 degrees from horizontal) shall be provided with roofing materials having a solar absorptance not exceeding 0.75, as tested in accordance with ASTM E1918 or C1549. For unrated roofing materials, solar absorptance values shall be taken from Table 402.3(1).

TABLE 402.3(1)
DEFAULT ROOF SOLAR ABSORPTANCE VALUES

ROOF MATERIAL	SOLAR ABSORPTANCE
White Composition Shingles	0.80
White Tile (including concrete)	0.60
White Metal	0.50
All Others	0.92

3. Add new standards to Chapter 6 as follows:

ASTM

E1918-06	Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
C1549-04	Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field

An identical change was proposed for the IRC.

Results of First Hearing

Committee vote for disapproval 8-3 (IECC). Commenters did not like the proposal's format, which was modeled after the reflective roof provisions of the RESNET HERS guidelines. There was a clear preference for casting the requirements in terms of reflectance rather than absorptance. There was also discomfort with the subjectivity of the proposed default solar absorptance table.

Suggested Public Comment

Based on feedback to date, DOE is considering submitting the public comment shown below.

Revise the code change to read as follows:

Add new definitions:

SOLAR REFLECTANCE. The ratio of reflected solar flux to incident solar flux.

THERMAL EMITTANCE. TBD

Add new section, text, and table as follows:

402.3 Roof solar reflectance and thermal emittance. Low-sloped roof areas (slope < 2:12) directly above cooled spaces in climate zones 1, 2, and 3 shall comply with one or more option in Table 402.3(1).

Exceptions:

- 1) Roof areas that include or are covered by
 - a) photovoltaic systems or components,
 - b) solar air or water heating systems or components,
 - c) roof gardens or landscaped roofs,
 - d) above-roof decking or walkways,
 - e) fenestration, such as skylights, or
 - f) HVAC systems, components, and other opaque objects mounted not more than one foot (0.3 m) above the roof,
- 2) Roof areas shaded during the peak sun angle on June 21st by permanent features of the building or by permanent features of other buildings
- 3) Ballasted roofs with a minimum stone ballast of 17 lbs/ft² (74 kg/m²) or pavers of 23 lbs/ft² (117 kg/m²)
- 4) Roofs where a minimum of 75% of the roof area meets one or more of the exceptions above.

Table 402.3(1)

Minimum Roof Reflectance and Emittance Options^{a, b}

<u>Three-year aged solar reflectance^c of 0.55 and Initial thermal emittance^d of 0.75</u>
<u>Initial solar reflectance^c of 0.70 and Initial thermal emittance^d of 0.75</u>
<u>Solar Reflectance Index^e of 64</u>

a. The use of area-weighted averages to meet these requirements shall be permitted.

b. Materials lacking tested values shall default to 0.10 for solar reflectance and 0.90 for thermal emittance.

c. Solar reflectance tested in accordance with ASTM C1549, ASTM E903, or ASTM E1918.

d. Thermal emittance tested in accordance with ASTM C1371 or ASTM E408.

e. Solar reflectance index (SRI) determined in accordance with the SRI method in ASTM E1980 using a convection coefficient of 2.1 BTU/h-ft²-F (12W/m².K). SRI shall be calculated from an initial thermal emittance and a 3-year solar reflectance.

Add new references as follows:

TBD.

An identical public comment will be submitted for the IRC.

Public Comment Development

Testimony at the Initial Action hearings focused on the structure of EC-71. DOE believes the above Public Comment addresses those concerns. The Public Comment is identical to parallel changes DOE is supporting for commercial structures via Public Comment on EC147.

Interested and affected parties are encouraged to provide comments on the above public comment which is proposed as a starting point development of a public comment that could address this issue in the code.